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FEDERAL ENERGY MANAGEMENT PROGRAM

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Sustaining Energy Security

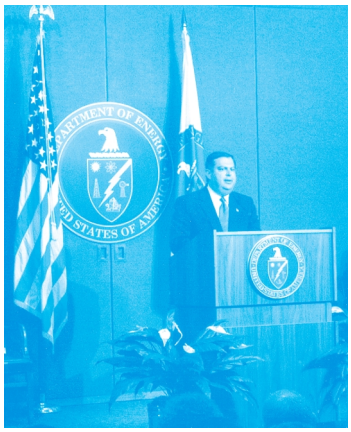
U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy June 2002

Secretary Abraham Announces DOE's Largest-Ever Purchase of Renewable Energy

"Today I am pleased to announce that the Department of Energy will purchase electricity generated from renewable resources to power roughly 17 percent of our electricity needs at DOE Headquarters, including our Germantown facilities."

—Secretary of Energy Spencer Abraham

At a DOE ceremony with employees to mark the 32nd anniversary of Earth Day on April 22, 2002, Secretary of Energy Spencer Abraham announced the largest-ever purchase of electricity generated from renewable energy for DOE Headquarters facilities in Washington, D.C. and Germantown, Maryland, and challenged its other sites to take similar action. Secretary Abraham made his remarks to employees in the DOE Forrestal Building. The ceremony included Dr. Edward Mayberry, President and Chief Executive Officer of Pepco Energy Services; General Services Administrator Stephen Perry; and DOE Assistant Secretary for Energy Efficiency and Renewable Energy David Garman.



Secretary of Energy Spencer Abraham addresses the audience at the April 2002 Earth Day ceremony.

"Today I am pleased to announce that the Department of Energy will purchase electricity generated from renewable resources to power roughly 17 percent of our electricity needs at DOE Headquarters, including our Germantown facilities," announced Energy Secretary Abraham. "Our new contract calls for an annual purchase of 6 million kilowatthours, roughly the amount of electricity needed to power 600 homes each year."

Dr. Mayberry of Pepco Energy Services said, "We are proud to support our nation's government facilities—the Department of Energy and the General Services Administration—with electricity generated by renewable sources in an affordable and flexible manner. Our ability to offer customers affordable alternative energy resources has become more important today than ever before. To date, Pepco Energy Services is providing green power to more than 25 percent of its customers in the mid-Atlantic region."

The DOE Headquarters Engineering and Facilities Management Group in the Office of Administration arranged for renewable energy to be supplied by Pepco Energy Services as

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IN THIS ISSUE

Beth Shearer
FEMP Director

Director's Update

Summer is a crucial time to practice energy efficiency and reduce the stress on our power grids. The blackouts and high energy bills of recent summers are lessons for the need to redouble Federal efforts to minimize energy shortages and increase our use of alternative sources of power. But we do this at a time when we also must focus our attention on improving the security of our Federal sites. I urge you to read about the opportunities for improving security at Federal facilities while also advancing the Federal commitment to energy efficiency on page 3 of this issue. The actions that you have taken in past summers and throughout the year with the implementation of energy efficiency and electrical load reduction measures are making a difference. As always, FEMP is ready to assist you with energy-saving projects, renewable power purchases, or any of your energy management decisions.

— Beth Shearer, Director
Federal Energy Management Program

SECRETARY ABRAHAM ANNOUNCES DOE'S LARGEST-EVER PURCHASE OF RENEWABLE ENERGY *(continued from page 1)*

part of a competitively-awarded contract for electricity. The contract was awarded and administered by the General Services Administration's Energy Center of Expertise. DOE funded the premium for the renewable portion of the contract using the savings it realized through the competitive procurement process, resulting in no net increase in DOE's utility bill. Additionally, DOE insisted on purchasing a blended renewable power product comprised of 25 percent wind power, supplied by Community Energy Inc., and 75 percent landfill gas-fired generation to demonstrate the importance of supporting a diversified domestic energy resource base.

DOE's renewable energy purchase supports the Federal renewable energy goal. The goal states that the equivalent of 2.5 percent of Federal facility electricity consumption must be derived from new renewable energy sources by FY 2005. The purchase also supports a recent DOE Order signed by the Secretary establishing a department wide goal of 3 percent of electricity use coming from renewable resources by 2005 and 7 percent of electricity coming from renewable resources by 2010. Additionally, this green power purchase enables DOE Headquarters to become a partner in the Environmental Protection Agency's Green Power Partnership, a voluntary program that encourages public and private organizations to purchase renewable power. (See article on page 8.)

For more information or for assistance with renewable power purchases, please contact Chandra Shah at 303-384-7557 or chandra_shah@nrel.gov, or David McAndrew of FEMP at 202-586-7722 or david.mcandrew@ ee.doe.gov.

Secretary of Energy
Spencer Abraham

Assistant Secretary,
Office of Energy Efficiency
and Renewable Energy
David K. Garman

FEMP Focus Editor
Annie Haskins

Security in Federal Buildings Creates Energy Saving Opportunities

There is ample reason for today's heightened concern for security in our Federal offices, military facilities, National Laboratories, and other public buildings—but does this mean we have to put on hold the Federal commitment to energy efficiency and sustainable design? Are there ways that energy savings and security improvement can complement each other? And in cases where there may be trade-offs between improving energy efficiency and security, how can the Federal government lead the way in developing and deploying new, advanced technologies that improve the terms of that trade-off (or make trade-offs unnecessary in the future)?

Both energy cost savings and improved building security are elements of sustainable building design and operation—along with increased comfort, lower maintenance costs, and improved workplace health and productivity. FEMP is interested in the relationships between building security and energy efficiency as one key element of the "business case" for sustainable Federal facilities. We would like to hear from *FEMP Focus* readers who have further ideas or examples on this subject.

Federal buildings may account for only a small portion (about 2 percent) of the total U.S. building stock and an equally modest percentage of U.S. industrial facilities, but they represent a disproportionately high share of potential terrorist targets, due to their symbolic importance and functional value. Thus, in the years to come, Federal investment may comprise much more than their proportionate share of all commercial floor space (about 2 percent) in terms of spending to upgrade building security and add protective features in new construction. The Federal sector, in effect, will serve as a real-life laboratory for enhancing building security through measures that improve threat detection, reduce vulnerability of people and property, and speed the process of recovery after a possible attack.

In both new and existing buildings, it is possible to improve building security and address energy efficiency at the same time. If energy efficiency is ignored in the process, however, important opportunities will be missed. Ideally, more building security projects should consider energy efficiency and renewable energy opportunities, especially in cases where energy cost savings could in turn help lower the life-cycle costs of security improvements.

For example, the National Aeronautics and Space Administration (NASA) already incorporates building security guidelines as part of its sustainable design criteria for new facilities. Some standard design criteria, such as structural engineering for wind and seismic loads, can help address blast-resistance as well. NASA's compilation of materials used by other agencies for building security planning and mitigation is available on CD-ROM. (Contact Steve Rider of NASA at 202-358-0872 or steve.rider@hq.nasa.gov.)

The ongoing Pentagon renovation also illustrates the close linkage between energy efficiency and building security. According to DOD's Teresa Pohlman, Special Assistant for Sustainable Construction, "In the process of

A contractor installs a blast-resistant window frame in the outer facade of the Pentagon's E-ring. The new windows also have a better U-value and are more tightly sealed to help reduce infiltration levels.

renovating the Pentagon we've found that several of the force protection measures we are taking to protect the Pentagon against terrorist attacks are complementary to our sustainable construction efforts."

For example, Pohlman points out that a spray-on wall coating being considered at the Pentagon to provide blast-resistance would also provide extra benefits by improving the air-tightness of the building envelope, which in turn saves heating and cooling energy. A tighter envelope would also provide added protection against airborne chemical/biological agents released outside the building (or help contain interior releases until they can be dealt with safely).

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SECURITY IN FEDERAL BUILDINGS CREATES ENERGY SAVING OPPORTUNITIES
(continued from page 3)

Another example of energy-savings is the facility's new windows—the blast-resistant windows that are replacing the original ones at the Pentagon are 50 percent more energy efficient. The Pentagon is planning to use photo luminescent signs (which draw no power) on the floor and lower wall areas to mark building evacuation routes during a fire or blast event; this will help personnel exit quickly in case the conventional ceiling-mounted "exit" signs are obscured by smoke. A final example is the use of zoned climate control systems that not only provide improved indoor air quality and more efficient heating and cooling, but also make it easier to control smoke and chemical/biological agent proliferation. "These are all examples of building security and energy efficiency working hand-in-hand," Pohlman concludes.

Other examples of positive interactions between security and efficiency measures include:

- Improving control of building air distribution systems—including periodic calibration of sensors, adjustment of dampers, and other system maintenance—is essential for rapid response to an emergency while also contributing to energy-efficient operation under normal conditions.
- Significantly reducing air leaks in the building envelope and distribution ducts is helpful in balancing heating and cooling systems, and even more critical to prevent unwanted entry or spread of airborne toxins released by an attack in or near the building.
- Daylighted spaces may be easier to evacuate quickly in the event of an attack or threat accompanied by a power outage.
- On-site power systems may be marginally economic in terms of reduced peak electricity charges alone, or to improve reliability during utility system outages (natural or human-caused), but the combined benefits of reliability and peak savings may make them much more attractive–especially for low-emission systems that also recover and use the waste heat.
- Upgrading existing windows for blast resistance may also create opportunities to improve thermal and optical (daylighting) performance, provided that the window system or add-on film is selected carefully.
- Redesigning security lighting in concert with automated sensing and surveillance systems may actually reduce the need for constant high nighttime lighting levels, while improving detection capabilities.
- Improvements to particle air filtration have several potential benefits, in addition to helping protect buildings from biological agent attack. These include reducing indoor particle concentrations from other sources, thereby improving occupant health (and productivity), and helping reduce HVAC coil fouling which in turn improves heat exchange efficiency.

To identify these and other opportunities, FEMP is meeting informally with facility managers and security specialists in several Federal agencies. We are reviewing relevant work on building security by agency working groups and organizations such as ASHRAE to identify ways of incorporating energy efficiency measures into their recommendations. The Buildings Program of DOE's Office of Energy Efficiency and Renewable Energy is also studying the linkages between energy efficiency and building security, and considering their implications for both research and development and technology deployment.

Ongoing FEMP activities could also create paths to address building security along with energy efficiency. Examples include: guidelines on sustainable Federal facilities, design assistance for new construction, support for on-site distributed energy resource projects, Federal facility energy audits, operations and maintenance training, new technology demonstrations, and alternative financing of energy retrofits. FEMP could also consult with other agencies to identify Federal demonstration sites or initial buyers for new, dual-purpose technologies such as advanced HVAC sensors and controls, high-performance filtration that minimizes added fan loads, and improved window films.

For more information or to forward comments, please contact Beverly Dyer of FEMP at beverly.dyer@ee.doe.gov or Jeff Harris of LBNL at jpharris@lbl.gov.

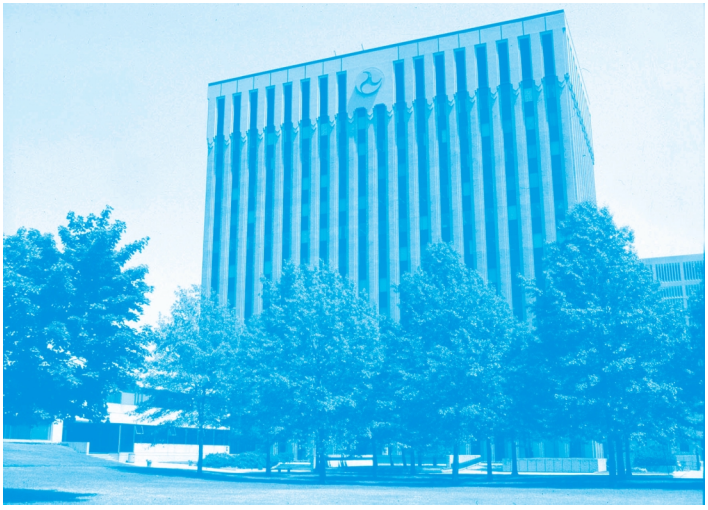
DOE Northeast Region Launches FY 2002 ALERT Activities

ALERT Teams Preventing Power Outages

On February 25, 2002, the kick off of FEMP's Assessment of Load and Energy Reduction Techniques (ALERT) activities began in the Northeast Region with a 3-day training session conducted by the staff of DOE's Pacific Northwest National Laboratory (PNNL) and DOE's National Renewable Energy Laboratory (NREL). The classroom and hands-on training were held at the Department of Transportation's John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts. Participants included staff from DOE's Northeast and Philadelphia Regional Offices, DOE's National Laboratories, local electric utilities, energy efficiency specialists, and the Volpe Center.

ALERT activities began as a response to California's energy crisis of 2001, when electricity supply problems resulted in blackouts and price spikes during peak demand hours. Twenty-five Federal facilities were assessed across the State. According to the FY 2001 ALERT Program Report, the most common recommendations to reduce demand and energy usage focused on the following areas:

- lighting (32 percent),
- operations and maintenance (24 percent), and
- controls (19 percent).



An ALERT team recently assessed the Department of Transportation's Volpe Center in Cambridge, Massachusetts.

The primarily low- or no-cost measures identified were estimated to produce average demand savings of 9.2 percent and annual cost savings averaging 10.4 percent.

Following the success of the California emergency response effort, ALERT is now a nationwide effort seeking load and consumption savings, and advising Federal facility managers about resource availability to meet more capital-intensive energy efficiency needs.

ALERT relies primarily on four factors for success:

- records of facility energy use,
- observation of building systems in operation by small teams skilled especially in HVAC and energy management systems,
- knowledge and skills of on-site facility managers and staff about their facility, and
- facility managers and staff committed to making change.

Training and Assessment at the Volpe Center

Following a day-long program in which ALERT goals, strategies, and procedures were detailed, the ALERT team assessed the Volpe Center for the program's hands-on training exercise. ALERT team members and trainees, including the Volpe Center's energy manager and several Volpe staff, spent 2 days observing an assessment of the building as well as hearing a presentation of the findings.

The Volpe Center is an office complex of 385,000 square feet, consisting of a 13-story office tower and several attached buildings. Built in the late-1960s, Volpe is a national research center for the Department of Transportation. The facility's control and mechanical systems have been periodically updated to accommodate the addition of computer centers and other changes in interior space. An energy services contractor maintains the control systems.

Volpe is typical of many "middle aged" buildings. Improvements to the facility's heating and cooling equipment

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DOE NORTHEAST REGION LAUNCHES FY 2002 ALERT ACTIVITIES
(continued from page 5)

and distribution systems and controls have been mainly incremental, without a complete system re-design. A long-range facility planning project is currently under way with PNNL. The facility manager and staff are focused on operational reliability and occupant comfort, health, and safety. In 1997, Volpe implemented the first energy savings performance contract at a Department of Transportation facility. *Energy User News* recognized the project, which was nominated by the DOE Boston Regional Office, with their "Best Retrofit" Award in 2000.

At Volpe, the ALERT team found equipment and behavioral opportunities including:

- an energy management system requiring adjustment to better match heating and cooling to building occupancy hours,
- pneumatic lines requiring repair,
- papers in offices covering air vents and impeding building comfort control, and
- a defective pressure gauge requiring repair.

At the presentation of findings and recommendations, Volpe staff had the opportunity to comment on all aspects of the assessment. The team subsequently provided a written report detailing the process, findings, and recommendations.

ALERT Audits Under Way

Since the training, ALERT teams have visited five other facilities in New England and New York; several more assessments are scheduled in the coming months. Sites were selected through an analysis of total electric demand, energy use, and energy intensities of Federal facilities in the New York–New England Region. These facility analyses were developed in a 2-year effort to profile regional Federal facilities including the General Services Administration, Army, Navy, Coast Guard, Veteran Affairs, and National Park Service facilities.

The first three ALERT assessments included two Naval facilities and a GSA Federal Courthouse. Managers at each of these Federal facilities had taken a number of actions over the past several years to increase energy efficiency including initiating SAVEnergy audits (and implementing some energy efficiency measures), working with local gas and electric utilities to implement energy efficiency improvements, and implementing aggressive fuel and electricity purchase programs.

The ALERT teams found a variety of opportunities. One facility consisting of multiple buildings had multiple older-generation energy management systems and was not getting significant benefit from them. The ALERT team recommended searching for a comprehensive solution rather than trying to maintain the existing, isolated, and outdated systems.

One Federal facility had implemented a number of low-cost recommendations from a SAVEnergy audit with excellent payback, but did not have resources to undertake more substantial measures. The ALERT team was able to assist the facility with documenting the additional measures allowing facility managers to apply for funding to implement some of the more substantial energy efficiency measures.

A Federal facility developing a new energy management system experienced difficulties procuring the type of system they needed. The ALERT team was able to provide information about solutions other Federal agencies have developed to address similar situations.

"ALERT teams were able to identify immediate low-cost or no-cost opportunities for each Federal facility assessed thus far," said Paul King of DOE's Boston Regional Office. He added, "the ALERT team visits presented an opportunity to focus on energy issues at the highest facility management levels. This focus also served to renew commitments to actively managing energy use and recognizing the importance of effective energy management."

For more information about ALERT team activities in the New York-New England Region, please contact Paul King of DOE's Boston Regional Office at 617-565-9712 or paul.king@ee.doe.gov. For more information on the ALERT Program, please contact Ab Ream at 202-586-7230 or ab.ream@ee.doe.gov.

Edwards Air Force Base Goes Green and Saves Big

In 1994, California was emerging from a deep recession and electricity prices were among the highest in the country. In 1996, the California legislature tried to relieve prices and stimulate the economy by deregulating the electric utility industry. Deregulation laws, signed in 1996 and implemented in 1998, allowed customers to purchase electricity from a third party supplier or an energy service provider (ESP).

Deregulation laws froze utility rates until April 2002, or until the utilities recovered "stranded" costs incurred by deregulation. The California Power Exchange was also established as a clearinghouse for utility companies and ESPs to buy and sell power. After monitoring California Power Exchange prices for the first few months, and after unsuccessful attempts to purchase electricity through an ESP, Edwards Air Force Base (AFB) decided to continue buying power from the local utility company, Southern California Edison (SCE), at its frozen tariff rate.

This strategy proved correct until the summer of 2000, when the California electricity market became dysfunctional. Prices tripled on the California Power Exchange, going as high as 60 cents per kilowatthour, rolling blackouts began, and utility companies were losing billions of dollars. Although Edwards' utility rates did not increase during this period, its frozen rate was in danger of ending. SCE stated its stranded costs had been recovered and requested the California Public Utility Commission (CPUC) allow it to unfreeze its tariff so it could charge market-based rates. Edwards AFB was facing major rate increases *and* a decision by the California legislature to prohibit customers from obtaining power from an ESP.

A Bold Idea Develops

These events highlighted the urgency of finding an ESP to provide power at a fixed price for a term of 3 to 5 years (the base's estimate of the time needed for the California electricity market to resolve its problems and become truly competitive, or for the State to return to regulation). Paul Weaver, Energy Manager for Edwards AFB's 95th Civil Engineer Group, had already made contact with ESPs that indicated an interest in such an arrangement, and which also offered renewable power at a price comparable to the frozen tariff rate.

Edwards AFB's contracting office issued a sources sought notice in October 2000 for providing renewable power at or near the current frozen rate. "We weren't sure what to expect because we were asking for renewable power at fossil fuel prices—something no other Federal agency had successfully done. But based on previous discussions with ESPs, we knew we had to try," said Weaver.

After receiving five responses to the sources sought notice, Edwards AFB issued a pre-solicitation notice for a request for proposals (RFP). The base received several responses, with two appearing to satisfy all the requirements. Another potential bidder who could meet the requirements was identified later. An RFP was issued in April 2001 to the three identified sources to provide all the supplemental power (approximately 133,000 megawatt hours or 60 percent of total load) that Edwards AFB needed above the Western Area Power Administration (WAPA) hydropower allocation for a period of 5 years. Two of the three sources responded. An evaluation team composed of the Air Force Civil Engineer Support Agency (AFCESA) and Edwards AFB personnel reviewed the bids. Only one of the sources could fully meet the base's requirements; then negotiations began. At the same time, negotiations began with SCE for a modified Power Displacement Agreement (PDA). The PDA is a crediting mechanism in which SCE actually delivers all the power to the base, but credits the base for its WAPA hydropower allocation, and now green power, received at other points on their grid.

Paydirt

During negotiations, Edwards AFB discovered that it was faster to use WAPA as the contracting agent to award the renewable power contract. Timing was critical since the base expected the CPUC to suspend use of ESPs on July 1, 2001. The base executed an interagency agreement with WAPA to permit them to award the contract. Negotiations were completed in May 2001, and a contract was awarded to Enron Corporation to supply renewable power to Edwards AFB starting June 1, 2001. (While Enron may be experiencing contract problems elsewhere, the Edwards AFB contract is in good shape and continued service is not endangered. It has remained profitable for Enron and it is highly likely the contract could be successfully assigned to another energy company in the event Enron desires to withdraw.)

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EPA's Green Power Partnership Advances Renewable Power Alternatives

Is your facility currently using or purchasing renewable energy? Are you interested in installing or procuring renewable energy resources at your facility? Federal agencies have an opportunity to participate in the Green Power Partnership, a new voluntary program developed by the Environmental Protection Agency (EPA) in response to the President's National Energy Policy. Federal agencies are encouraged to join the Partnership, which includes corporations, cities, universities, and two Federal partners—EPA and DOE. The Partnership assists and promotes organizations that commit to using renewable power for a portion of their electricity needs. The Partnership's renewable power purchase requirements range from 2 to 15 percent of load depending on the purchaser's annual electricity consumption.

Partners may use any combination of direct renewable power purchase, tradable renewable energy certificates, (also known as "green tags" or renewable energy credits), or on-site generation to fulfill their Partnership obligation. Once a Partner signs a Letter of Intent to join, the Partnership provides renewable power information, communications support, and public recognition.

For more information, see the Green Power Partnership's web site at www.epa.gov/greenpower/ or contact Pam Bloch Mendelson, working with EPA through an interagency agreement in DOE's Denver Regional Office, at 303-275-4819.

For assistance with renewable power purchases, please contact Chandra Shah at 303-384-7557 or chandra_shah@nrel.gov, or David McAndrew at 202-586-7722 or david.mcandrew@ee.doe.gov.

EDWARDS AIR FORCE BASE GOES GREEN AND SAVES BIG
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The contract requires 25 percent renewable power in the first 2 years and up to 100 percent renewable power at the end of the third year. The renewable power would be a mix of wind and biomass power initially, with the potential for 100 percent wind power in the last 3 years of the contract.

Delivery started June 1, 2001, using the PDA with SCE. "This is a win-win agreement," said Weaver. "Edwards gets lower prices. SCE gets power at competitive prices to meet demand where they need it, and California gets power from out of State, reducing their generation shortages. Enron benefits with their first large-scale renewable power sale in California, helping them further develop renewable power products."

The renewable power purchase will save the base approximately $42 million in electricity costs over the 5-year period of the contract based on the current SCE tariff rate. In addition, the renewable power will help Edwards AFB meet its current energy conservation goals and renewable power goals as mandated by Executive Order 13123.

"The initiative took a number of unexpected turns and experienced some setbacks, but stayed alive with the support of open-minded base leadership," said Mike Santoro, a team member of the Edwards project and Senior Engineer for the utility rates management team at Headquarters AFCESA, Tyndall AFB, Florida. "The team effort could not have been accomplished without the hard work, dedication, and persistence of Captain Amy Hoffer and Paul Weaver of Edwards AFB's 95th Civil Engineering Group, Mike Keeling from base Contracting, John King and Ray Haug of SCE, Penny Casey of WAPA, and Major Jeff Renshaw of AFCESA, and the senior leadership of Lieutenant Colonel Greg Emanuel, Colonel James Judkins, and Colonel Robert Hood of Edwards AFB."

For more information or assistance with renewable power purchases, please contact the AFCESA utility rates management team at 850-283-6463/6348 or David McAndrew of FEMP at 202-586-7722 or david.mcandrew@ee.doe.gov.

Plan Now for DER at Federal Facilities Workshops

Atlanta • Chicago • Boston • Los Angeles

FEMP is conducting a series of hands-on, project-focused Distributed Energy Resource (DER) workshops. FEMP's DER workshops offer opportunities for Federal facility energy managers interested in applying DER technologies to meet and work with private industry representatives interested in supporting DER projects with financing and/or equipment. Other key actors for DER success including environmental regulators and utilities will also participate. DER technologies include any decentralized energy storage and/or delivery systems located near the point of use, such as gas turbines, fuel cells, reciprocating engines, solar photovoltaic, and combined heat and power (CHP) systems. The workshops focus on providing information, resources, and contacts that will allow participants to identify where DER technologies can be cost-effective in supporting agency missions, and to help initiate sound DER project development.

Who should attend? Officials from Federal, regional, and State organizations involved in energy management and procurement; private- and public-sector energy and environmental organizations; and regulatory, financing, legal, and energy service organizations involved with DER are encouraged to attend. The workshops will be particularly relevant for any Federal representative who wants to explore their DER opportunities with potential partners and experienced colleagues. The workshops will highlight new FEMP resources to support agencies in assessing DER costs, benefits, and opportunities, such as the screening available for CHP applications.

Workshop topics will include the following:

- DER technologies and systems,
- DER and energy security,
- resources for developing DER projects,
- financing DER projects,
- case studies, and
- getting your DER project started.

Boston Workshop

The Atlanta and Chicago workshops are now over, but you can register for upcoming Distributed Energy Resource (DER) project development workshops. On October 23-25, 2002, FEMP is offering the DER at Federal Facilities Workshop in Boston, Massachusetts, in conjunction with the annual Combined Heat and Power Roadmap Workshop.

Los Angeles Workshop

A DER Western Region workshop is scheduled for spring 2003 in Los Angeles, California. Dates for the workshop are to be announced.

For more information, please see www.eren.doe.gov/femp/techassist/der_resources.html.

FEMP Hosts DER Project Development Workshop in Chicago

FEMP recently held it's second successful Distributed Energy Resource (DER) at Federal Facilities Workshop. The workshop was conducted at the Sofitel Water Tower Hotel in Chicago, Illinois, on June 25-26, 2002. Sponsored by FEMP and the U.S. Combined Heat and Power Association, the Chicago DER workshop featured Tom Casten, President and Chief Executive Officer of Private Power, LLC, as the keynote speaker and included ample discussion of local needs and the steps necessary to identify and implement DER projects.

Workshop participants heard from industry representatives in sessions focusing on:

- project feasibility,
- contracting tools and financing,
- utility interface,
- regulations,
- permits, and
- code issues.

Participants also attended breakout sessions to learn about DER installation and application issues.

The May 2002 Atlanta DER workshop, the first in the workshop series, was equally as informative and well attended as the Chicago workshop. If you have not yet attended one of the DER workshops, mark your calendar for upcoming workshops in the series.

Please see the accompanying article for upcoming workshops in the series. For additional information, please contact Shawn Herrera of FEMP at 202-586-1511.

NEW TECHNOLOGY DEMONSTRATION PROGRAM

New Technologies: *Caveat Emptor* (Let the Buyer Beware)

Three previous articles on FEMP's New Technology Demonstration Program have discussed how new and emerging technologies may be used to make significant progress toward achieving Federal energy reduction goals. However, as with all things new, there are risks.

As noted in the first article in this series, some risks are minimized by evaluating new technologies on a limited basis before they are deployed on a larger scale. Demonstrations and pilot projects allow Federal sites to "look before they leap." From case studies, one site may learn from the lessons of others.

The purpose of the FEMP New Technology Demonstration Program publications is to get information about new and emerging energy efficiency, water-conserving, solar, and other renewable energy technologies into the hands of Federal energy managers and to encourage them to consider technologies that may assist them in achieving their energy goals.

Within the FEMP New Technology Demonstration Program, only the demonstration reports are based on measured and verified findings. Unfortunately, metered demonstrations are expensive and take a long time to produce results. For the other publications, including *Federal Technology Alerts*, *Technology Installation Reviews*, and *Technology Focuses*, the program does not independently verify performance data provided by manufacturers or obtained from literature reviews.

All of the program's publications are for informational purposes only. Neither DOE nor DOE National Laboratories are implying endorsements of either the technology or the technology provider. Those who claim DOE, FEMP, or DOE National Laboratory endorsement are misleading the public. Furthermore, program publications are not substitutes for sound engineering or due diligence on the part of the reader. (The program does, however, strive to be accurate and responsible. Remember, the program's objective is to help Federal agencies achieve their energy management goals.)

New and emerging technologies are also subject to change. It is important to note the date of the publication. New Technology Demonstration Program publications offer a snapshot of a technology at a given time. As time passes, technologies, costs, maintenance recommendations, and even manufacturers change. In many cases, this can be a good thing. In the case of the *Natural Gas Fuel Cell Federal Technology Alert*, the manufacturer made numerous improvements to the equipment as more was learned about the technology. However, there may be other changes. New manufacturers may develop the product line that may not have been in that business when the report was published. Other manufacturers, which were known at the time of publication, may relocate, merge, consolidate, drop the product line, or even go out of business. Readers must do their homework.

Federal energy managers and facility staff need to be wary: *Caveat emptor*, let the buyer beware, definitely applies. FEMP is aware that some New Technology Demonstration Program publications have been altered, without DOE consent, and distributed as genuine DOE reports. There are web sites that have copied FEMP's *Federal Technology Alerts* from FEMP and DOE National Laboratory web sites. Some are honest, others have purposely been altered either to make the technology appear more positive or modify the list of technology providers. If the web site you are reading does not have a ".gov" web extension, then *caveat emptor*.

Again and unfortunately, the problem of altered DOE publications is not limited to the Internet. FEMP is also aware that some *Federal Technology Alerts* have been purposely modified and reprinted to make the technology and vendor look more positive. In some cases, it is very difficult to determine which publications are genuine and which have been altered. (One method that can be used to identify an altered New Technology Demonstration Program publication is to look at the section that lists manufacturers or suppliers. Unusual arrangements of white space, cover ups, or other unusual print marks, may indicate that the document may not be genuine. Be cautious, other statements throughout the report may also have been altered.) If you have any doubts whether the FEMP publication you have is genuine, visit the FEMP web site to

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NREL Named Partner in EPA Climate Leaders Program

DOE's National Renewable Energy Laboratory (NREL) was recently named a charter member of the Environmental Protection Agency's (EPA's) Climate Leaders program. NREL is the first Federal partner to join the program. On March 25, 2002, NREL and other Climate Leaders Partners participated in EPA's Climate Leaders Summit, which focused on the latest developments in climate change policy and innovations in greenhouse gas (GHG) management.

Charter members, recognized by EPA's Administrator Christine Todd Whitman at the conference, have committed to completing a corporate-wide GHG inventory and working with EPA to set an emissions reduction target. These companies represent a diverse group of energy-intensive and service-oriented companies.

"The companies that participate in this program—promising to meet a higher standard than other companies in their sector—are showing true leadership as environmental stewards," said Whitman. "They are proving that doing what is good for the environment is also good for business. They are providing an example to everyone that we all must do our share to address the effects of climate change—and we must start now, as they have."

Bob Westby, Director of NREL's Energy and Environmental Applications Office and the Sustainable NREL program, said that NREL places tremendous importance on the need to maintain a sustainable environment in our own workplace. "We believe that our institution should use minimal resources (energy, materials, water, etc.) while receiving the maximum value from those resources used—along with balancing environmental, economic, and human impacts," Westby said. "EPA's Climate Leaders program provides a valuable opportunity for NREL to do its part in addressing the challenge of climate change."

Climate Leaders Partners work with EPA to develop corporate-wide GHG emissions inventories and set long-term GHG reduction goals. After partners complete their inventory, EPA works closely with them to develop a customized emissions reduction target. These targets must be aggressive long-term targets that exceed business-as-usual performance for the Partner's sector.

According to Dan Bilello, NREL's representative to the program, the Laboratory was a natural for the partnership. "We already are doing a lot of the same things in our comprehensive Sustainable NREL program, so this is a good opportunity for us to highlight and expand on what we've already done. NREL hopes to share its experiences in implementing a comprehensive sustainability program with other Federal agencies and universities with similar facility types."

Other Climate Leaders Charter Partners include:

- Alcan Aluminum Corporation, Cleveland, Ohio;
- Alcoa Inc., Pittsburgh, Pennsylvania;
- BP p.l.c., London, England;
- Bethlehem Steel Corporation, Bethlehem, Pennsylvania;
- Cinergy Corporation, Cincinnati, Ohio;
- FPL Group, Inc., Juno Beach, Florida;
- General Motors Corporation, Detroit, Michigan;
- Holcim (US) Inc., Dundee, Michigan;
- Interface, Inc., Atlanta, Georgia;
- International Paper, Stamford, Connecticut;
- Johnson & Johnson, New Brunswick, New Jersey;
- Lockheed Martin, Bethesda, Maryland;
- Miller Brewing Company, Milwaukee, Wisconsin;
- Norm Thompson Outfitters, Portland, Oregon;
- PSEG, Newark, New Jersey; and
- S.C. Johnson & Son, Inc., Racine, Wisconsin.

For more information about Sustainable NREL, please contact Bob Westby of NREL at 303-384-7534 or robert_westby@nrel.gov. Also see www.nrel.gov/sustainable_nrel/index.html. For more information on EPA's Climate Leaders program, please see www.epa.gov/climateleaders/.

NEW TECHNOLOGIES:
***CAVEAT EMPTOR* (LET THE BUYER BEWARE)**
(continued from previous page)

view the publication or to request a copy from DOE's Energy Efficiency and Renewable Energy Clearinghouse at 800-363-3732 or www.eren.doe.gov/femp/ordermaterials.html.

Technologies are continuously evolving. Efficiencies are improving, controls are improving, maintenance is being simplified. New and emerging technologies can be used to help the Federal energy manager achieve and surpass energy and cost reduction goals. Trying something new may not be easy or risk free, but the New Technology Demonstration Program is doing its part to help clear the way.

For more information, please contact Steven Parker of PNNL at steven.parker@pnl.gov or Ted Collins of FEMP at theodore.collins@ee.doe.gov.

Fort Knox Strikes Energy-Savings Gold in Innovative UESC Partnership

The U.S. Army's Fort Knox, "the Home of Armor," and home to one of the nation's gold reserves, faced a big challenge: cutting energy use without the funding to make energy-conserving upgrades. Gary Meredith, Energy Project Manager at Fort Knox, Kentucky, struck gold in a partnership with Nolin Rural Electric Cooperative. Meredith and Nolin's Vice President Vince Heuser came up with a plan for Fort Knox to meet energy-reduction goals through investments financed by the Cooperative. Says Meredith, "I like working with the Cooperative because of their no-nonsense approach to getting the job done to our specifications with the minimum amount of paperwork. Keeping it simple has kept costs down and is a key to success. The efforts of the entire utility and especially Vince Heuser have reflected a can-do attitude and have always been positive. The good-of-the-community attitude that radiates from this utility is a wonderful thing indeed and shows the foresight of top management and its governing board."

Heuser says Nolin is "committed to helping our members in whatever way we can. As a member-owned cooperative, our primary focus is not increasing revenue, but helping our members save money." This is exactly what the utility did for Fort Knox. Nolin and Fort Knox entered into a utility energy savings contract (UESC) in 1996, now totaling nearly $18 million in project investment and spanning numerous delivery orders. Annual savings exceed $2.8 million due to reductions of 13.8 million kilowatthours of electricity and 280,000 million cubic feet of natural gas.

Fort Knox, with a population of 26,900, is virtually a small city served by multiple utilities and businesses. Together, the Cooperative and the Fort identified projects and formalized them in simple delivery orders that included a geothermal heat pump installation, a boiler-chiller replacement, lighting retrofits, window replacements, and a high-efficiency motor retrofit. After each project is implemented, Fort Knox repays the loan over a 10-year period as part of its electric bill. The program costs the utility nothing, and the energy savings generated by the retrofits offset Fort Knox's project costs. Headquarters U.S. Army Training and Doctrine Command, Fort Knox's major command, reimburses the installation for payments made to the utility company for these projects as an incentive to aggressively pursue energy conservation measures and meet assigned goals.

The installation of geothermal heat pump systems are among the many energy-conserving upgrades at the Army's Fort Knox.

Rural electric cooperatives offer Federal agency sites with energy efficiency and renewable energy projects a key advantage—low interest rate financing from the National Rural Utilities Cooperative Finance Corporation (CFC). The monthly variable interest rate Nolin charges Fort Knox has been less than 4 percent. (This rate has only once risen above 7 percent over the past 5 years.) Interest payments form a significant portion of financed projects, so the low rates available through a UESC with rural electric cooperatives can be a great deal for Federal customers. The National Rural Electric Cooperative Association and CFC recently hosted a FEMP workshop to train other cooperatives in developing UESC business.

Fort Knox has received recognition for their energy efficiency efforts under this project, including the Army Energy Conservation Award for 1997. The Fort's energy-savings achievements are held up as a model for other Army installations.

For more information on utility energy service contracting with rural electric cooperatives, please contact Lisa Hollingsworth of DOE's Atlanta Regional Office at 404-562-0569 or lisa.hollingsworth@ee.doe.gov, Julia Kelley of Oak Ridge National Laboratory at 865-574-1013 or kelleyjs@ornl.gov, or David McAndrew of FEMP at 202-586-7722 or david.mcandrew@ee.doe.gov.

The Proper Use of Stipulations in M&V

The majority of Super Energy Savings Performance Contracts (ESPCs) projects have used measurement and verification (M&V) Option A for at least one energy conservation measure (ECM). This article discusses how M&V methods affect certainty and apportion risk and how to make Option A methods work with, not against, the savings guarantee.

Much of the information in this article was taken from FEMP's new *Detailed Guidelines for M&V Option A*, which provides recommended practices for using the Option A methods described in FEMP's *M&V Guidelines for Federal Energy Projects, Version 2.2*. The Option A guidelines bridge the differences between FEMP's M&V Guidelines and the latest revision of the Measurement & Verification Protocol (IPMVP 2000), also discussed in this article.*

Option A in Context

Agencies generally use the least expensive M&V option that provides sufficient certainty that savings guarantees are met. Option A, which allows stipulation rather than continuous measurement of some factors, includes some of the simplest and least expensive M&V methods. Overall costs for M&V in Super ESPC projects through FY 2001 have averaged 2.9 percent of guaranteed savings.

Why not use the M&V method that will provide the most accurate results possible?

M&V methods generally increase accuracy and certainty in proportion to their cost. At some point the incremental reductions in savings uncertainty are no longer justified by the increased costs. It makes good sense to do just the level of M&V needed, because M&V costs reduce the amount of savings available to purchase ECMs. Option A methods are generally less expensive than those that use more measurement or complex analysis.

What's the difference between "measured" and "stipulated" factors?

ESPC savings are determined by comparing energy use before and after the installation of ECMs. Savings cannot actually be *measured*, because they are defined in relation to a baseline that exists only on paper (after project installation) and represents the energy cost that would have occurred if no new ECMs had been installed. Energy usage is the product of factors such as energy demand, motor loading, operating hours, and weather conditions.

"Measured" factors are quantified by metering or monitoring of individual components, systems, or buildings. Measurements can be taken continuously, for hours, days, or weeks, or for moments to obtain data "snapshots." Data from these measurements are used to calculate savings using engineering calculations or models, regression or other analysis algorithms, or computer models.

To stipulate a parameter is to hold its value constant regardless of what the actual value is during the contract term. Option A methods allow some values to be "stipulated" instead of "measured" if they can be estimated with a reasonable degree of certainty and their contribution to overall uncertainty is small. Stipulated values must be based on reliable, traceable, and documented sources of information. Direct stipulation of energy savings is no longer allowed.

A stipulation in an ESPC M&V plan is an agreement between the energy service company (ESCO) and Federal agency to accept a defined value or functional form of a specific factor to be used in determining the baseline and/or post-installation energy consumption, which will be used to calculate the guaranteed savings. If related requirements are met (i.e., satisfactory commissioning results and annual verification of equipment performance and that maintenance is being done), the guarantee is considered to be met.

Measurement and Stipulation as Technical Terms

In fact, short-term measurements or data gathering of some kind is always among the sources of information used to arrive at stipulated values, but this is not equivalent to required measurements to verify savings. Similarly, not every aspect of every contributing factor is directly measured to verify savings. Stipulations are used in every M&V method without being called out as such in the M&V plan. For example, standard, accepted engineering practice used in M&V commonly includes the use of assumptions based on science and experience.

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* The FEMP M&V Guidelines are an application of IPMVP to Federal energy projects. IPMVP was written by and for technical, procurement, and financial personnel in the Federal government and the private sector to establish a framework for verifying performance in financed energy projects.

THE PROPER USE OF STIPULATIONS IN M&V
(continued from page 13)

For the purpose of discussing M&V plans and methods, *stipulations* are distinguished as values that the ESCO and agency agree to hold constant during the contract term. Once set, the stipulated value (or functional form) is always used in calculating savings. Conversely, the value of *measured* factors is repeatedly determined during the contract term and the actual values are used in calculations to verify savings.

New Definitions in IPMVP 2000

The 2000 version of IPMVP uses new definitions of Option A and stipulation, which makes them different from those in the FEMP M&V Guidelines. Under IPMVP 2000, Option A is now called "partially measured retrofit isolation," and compliance with IPMVP requires measuring at least one parameter. FEMP guidelines still allow verification without measurement in some cases. Also IPMVP 2000 defines a stipulated factor to be estimated or assumed but not measured, while FEMP's guidelines include measurements as a possible source of information for stipulations. The Option A guidelines bridge the differences by using the IPMVP definition of stipulation and by showing which Option A methods no longer comply with IPMVP.

What parameters are commonly stipulated?

Lighting operating hours, lighting fixture power, constant-volume fan power and schedule, and boiler efficiencies are commonly stipulated after equipment performance and schedules have been characterized. More complex parameters that are sometimes stipulated are chiller performance curves, variable frequency drive speed-demand curves, and equipment load frequency distributions.

Under what conditions does it make sense to use stipulated values?

The following are some indicators that stipulation may be appropriate:

- The ECM
  — has a high probability of delivering expected savings.
  — contributes a small percentage to overall project savings.
  — contributes a small percentage to overall project uncertainty.
- The agency
  — is willing to accept some uncertainty.
  — has experience with similar ECMs.
- The cost of monitoring is not justified by the value of increased accuracy.
- Monitoring serves no other purpose (such as performance monitoring or diagnostics).
- The ESCO has no control over the factor at issue (such as operating hours).

Considering Uncertainty

How should uncertainty influence how stipulations are used?

Overall savings uncertainty, and how much individual parameters contribute to overall uncertainty, are key considerations in whether to use stipulations. Savings uncertainty can be assessed by identifying the factors that affect savings and estimating the potential impact of each.

Rules of Thumb for Considering Certainty

These "rules of thumb" are keyed to the following figure (page 15):

1) The most certain, predictable parameters can be estimated and stipulated without significantly increasing uncertainty.
2) Stipulating parameters that represent a very small degree of uncertainty and a small part of overall savings will not significantly increase uncertainty.
3) Parameters that represent a higher percentage of project savings and uncertainty should be measured.
4) If estimated savings are high but uncertainty is low, the budget will support measurements, which could be used for monitoring equipment performance as well as for M&V.
5) If estimated savings are small and uncertainty is high, stipulation would only increase uncertainty, and consideration of whether the ECM is worthwhile might be warranted.

Whether to stipulate parameters that can vary over time because of weather, performance degradation, occupant behavior, or other factors depends on who will assume the "uncertainty risk."

Risks and Responsibilities

M&V Without Stipulations Leaves Risk with the ESCO

"Risk" in the M&V context refers to the uncertainty that expected savings will be realized. Assumption of risk implies

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THE PROPER USE OF STIPULATIONS IN M&V
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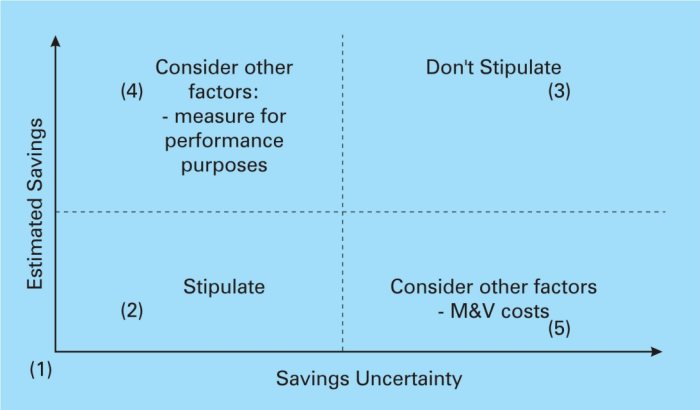

acceptance of the potential monetary consequences. If no stipulated values are used and savings are verified based on measurements, then all risk resides with the ESCO, which must show that the guaranteed savings are realized and compensate the agency for any shortfall, regardless of contributing factors.

Stipulations Shift Some Risk to the Agency

Using stipulations means that the ESCO and agency agree to use a set value for a parameter throughout the term of the contract, regardless of the actual behavior of that parameter. Stipulations shift some risk to the agency, because they mean that the ESCO gets credit for savings determined using set values that may vary in reality. The largest risk is that stipulated values may be incorrect and overstate the potential savings. In that case the agency has agreed to pay for unrealized savings. However, savings may also be greater than anticipated.

Why take the risk of stipulations at all?

Appropriately used stipulations can simplify M&V and reduce costs. They can also be used to precisely craft the guarantee and apportion risks and responsibilities. Both ESCOs and agencies are reluctant to assume responsibility for factors they cannot control, and stipulations are often used to match control and responsibility. Risks in energy projects can be categorized as relating to either equipment performance or usage.

Usage Risk—Typically Assumed by the Agency

Risk related to usage stems from uncertainty in operational factors. For example, savings fluctuate depending on weather, how many hours equipment is used, or how much energy is consumed for heating or cooling. Since ESCOs have no control over such factors, they are usually reluctant to assume usage risk.

The agency generally assumes financial responsibility for operating hours and load by either allowing baseline adjustments based on measurements, or by stipulating usage parameters. Where measurement is not practical, stipulations can be based on long-term historical trends, such as typical meteorological year weather data, occupancy rates, or production levels.

What are the potential outcomes of stipulating?

Stipulating operating hours often makes sense because the ESCO has no control over this factor. The potential consequences are small if the stipulated value can be estimated to a reasonable degree of certainty and represents an appropriately small proportion of overall project uncertainty. The risk can be reduced by basing the stipulated value on reliable information, including measurements before ECM installation.

In the case of operating hours, risk is mitigated by the fact that a variance from stipulated usage is offset by the correlated variance in utility bills. For example, if operating hours are lower than anticipated, both nominal savings and the utility bill are also less than anticipated (assuming that contracted energy rates for calculating savings match actual rates).

- **Example Lighting Project**

If operating hours were 20 percent lower than stipulated for a lighting retrofit that saved 20 percent of lighting energy use, the agency's costs associated with this ECM—taking into consideration costs for energy bills and fixed ESCO payments—would be about 5 percent higher than if no retrofit had been done. A 5 percent increase in lighting system energy costs would typically represent about 2 percent of the site's overall budget for electricity (assuming lighting represents 40 percent of building electrical load).

If operating hours were 20 percent higher than stipulated for the same hypothetical project, utility costs and savings would both be higher, and energy and ESCO costs associated with the lighting system would be about 3 percent less than if no retrofit had been done (again, assuming stable energy costs).

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THE PROPER USE OF STIPULATIONS IN M&V
(continued from page 15)

Equipment-Performance Risk—Typically Assumed by the ESCO

Performance risk is the uncertainty associated with characterizing a specified level of equipment performance. The ESCO is ultimately responsible for selection, application, design, installation, and performance of the equipment and typically assumes responsibility for achieving savings related to equipment performance. To validate performance, the ESCO must (at least) demonstrate that the equipment is operating as intended and has the potential to deliver the guaranteed savings. This almost always requires measurements. The ESCO also must achieve specified standards of service (temperature, humidity, and lighting levels, etc.).

If performance parameters are stipulated rather than measured, then the agency is assuming the risk of unrealized savings. For example, if equipment efficiencies are stipulated, the ESCO has no motivation to ensure that optimal efficiencies are maintained, because nominal savings will be calculated using the stipulated efficiency value. Actual savings, however, will be unknown.

Required M&V Activities

Using stipulations reduces, but does not eliminate, the need for other M&V activities. All Super ESPCs require defined energy-usage baselines, savings estimates, guaranteed savings relative to baselines, and procedures to verify performance and savings. Required M&V activities include the M&V plans, commissioning, and annual M&V reports.

M&V plans must show how performance of each ECM will be demonstrated, including calculations, assumptions, and sources of stipulated values. The ESCO's M&V plan must outline and schedule procedures to be performed during the contract term. The plan must specify periodic activities that will verify the ECM's continuing potential to deliver guaranteed savings and that performance standards are maintained.

Where stipulations are used,

1) the source of information and how it will be applied must be shown,
2) their impact on savings uncertainty should be discussed, and
3) their use (instead of measurements) should be justified.

Commissioning. After installation is completed, the ESCO must demonstrate the potential of the ECMs to perform as specified. The post-installation report should include M&V data resulting from commissioning and estimated first-year savings. The agency should not accept the project before it reviews this report and is assured that the ECMs were installed properly, are operating as expected, and show the potential to deliver guaranteed savings.

Annual M&V reports are required in ESPC projects. ESCOs are expected to submit annual reports that document savings in accordance with agreed-on procedures, show how they compare to guaranteed savings, "true-up" savings relative to the guaranteed amounts if necessary, and document other required activities.

What the "Smart Money" Says about Stipulations

One of the purposes of M&V is to reduce risk to an acceptable level, which is a subjective judgment based on the agency's priorities and preferences. The optimum level of M&V is that which minimizes both uncertainty and cost. Using stipulated values can be a practical, cost-effective way to minimize M&V costs. Stipulations do not erode savings guarantees when they are supported by reliable, documented information and analysis, and corroborated by verification of sustained performance.

Using stipulated values for determining savings does shift some risk to the agency, and the agency should thoroughly understand the risks before accepting them. However, stipulations used appropriately do not increase uncertainty significantly and do not jeopardize the savings guarantee, the agency's ability to pay for the project, or the value of the project to the government.

Before You Stipulate . . .

Check out the new *Detailed Guidelines for FEMP M&V Option A*, a companion to FEMP's M&V Guidelines, both available at www.eren.doe.gov/femp/financing/espc/measguide.html.

The "Responsibility Matrix," in the Super ESPC and FEMP's *M&V Guidelines*, is a list of risks and responsibilities to consider when negotiating projects and M&V plans. "Fine-Tuning for Best-Value Super ESPCs Using the Responsibility Matrix" discusses the Matrix and is available on FEMP's web site at www.eren.doe.gov/femp/financing/espc/implementing.html.

For more information, please contact Tatiana Strajnic of FEMP at 202-586-9230 or tatiana.strajnic@ee.doe.gov, or visit www.eren.doe.gov/femp/financing/espc.html.

Federal Facility Operators Awarded Building Operator Certification

In January 2002, the Northwest Energy Efficiency Council (NEEC) announced that 55 building operators working in Federal facilities completed training and were awarded the Building Operator Certification (BOC) – Level I. Three Federal participants received Level II certification. (See pages 18 and 19 for the list of BOC recipients.) BOC is a professional development program which certifies individuals in energy- and resource-efficient operation of building systems. BOC certification is earned by completing 7 months of classroom training (1 full day per month) and hands-on projects conducted at the operator's facility. The topics covered include HVAC systems and controls, energy conservation techniques, electrical systems, and indoor air quality.

Certifications such as BOC can be valuable for Federal facility staff and their agencies for many reasons. Many certification programs have an intensive classroom component, through which participants learn the most current building operations and practices, enabling them to improve energy use in their facilities. A study by the Northwest Energy Efficiency Alliance on the NEEC BOC program attributed savings of 330 megawatthours per year for each trained student. Certification programs also frequently offer continuing education credits. The BOC certificate is accredited by licensing departments and technical colleges for continuing education in several states, and is recognized by employers in 14 States.

Certification provides opportunities for professional development, and professional credentials demonstrate high levels of experience, competence, and specialized knowledge. It also provides objective benchmarks for validating skills of current employees, and assists as a hiring tool for organizations. Industry-wide, certification programs establish standards for professional practice. Participation in certification programs also helps agencies meet Executive Order 13123 requirements for training personnel in energy management.

FEMP's LOCATOR tool provides information on training opportunities such as certification programs. LOCATOR is a database tool of energy management training courses offered by the Federal government, professional associations, colleges and universities, industry groups, and other private-sector organizations. It can be accessed at www.eren.doe.gov/femp/resources/training/locator.html.

For more information on the NEEC BOC Level I and II course series, please contact Cynthia Putnam of NEEC at 206-292-3977 or cmputnam@aol.com, or visit www.neec.net/boc.htm. For additional information, please contact Arun Jhaveri of DOE's Seattle Regional Office at arun.jhaveri@ee.doe.gov.

The NEEC, a non-profit trade association, is just one of many organizations that offers professional certifications for energy professionals. Other organizations offering certifications for energy professionals include:

- The Energy Center of Wisconsin (www.ecw.org/ecw/trainings.jsp) also offers the BOC course series.
- The University of Wisconsin - Madison (http://epdweb.engr.wisc.edu) offers short courses and certificate programs such as the Energy Management diploma, which requires completion of four 1-week energy courses and an exam.
- The Association of Energy Engineers (AEE) sponsors the Certified Energy Manager (CEM), Certified Energy Procurement (CEP), Certified Power Quality (CPQ), and Certified Lighting Efficiency Professional (CLEP) certifications, among other certifications for energy professionals (www.aeecenter.org/certification). In 2003, AEE will also introduce two new certifications, the Certified Emissions Trader (CET) and the Distributed Generation Certified Professional (DGCP).
- The International Facility Management Association (IFMA) offers the Certified Facility Manager (CFM) program, and the Building Owners and Managers Institute (BOMI) offers courses for Systems Maintenance Technician (SMT), Systems Maintenance Administrator (SMA), and Facilities Management Administrator (FMA) designation (www.ifma.org).
- The Association for Facilities Engineering (www.afe.org) sponsors the Certified Plant Maintenance Manager (CPMM) and Certified Plant Engineer (CPE) programs.
- The Building Commissioning Association, which already offers courses through its Professional Development Program, is also designing a certificate in Building Commissioning, expected to be in place by the end of 2002 (www.bcxa.org).

FEDERAL FACILITY OPERATORS AWARDED BUILDING OPERATOR CERTIFICATION
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The BOC Awardees:

BOC Level I Awardees:

Name	Title	Agency/Facility	State
Ed Arel	Work Control Specialist	Pacific Northwest National Laboratory	WA
Sandra Beardsley	Building Technician	Pacific Northwest National Laboratory	WA
Dan Black	Mechanic	General Services Administration	WA
Shannon Blas	Engineering Technician	Naval Submarine Base Bangor Public Works	WA
Barry Brazzell	Work Control Specialist	Pacific Northwest National Laboratory	WA
Art Broszeit	Engineering Technician	Naval Hospital, Bremerton	WA
Charles Burton	Electrical/Maintenance Supervisor	Dept. of Veterans Affairs	OR
Dennis Bush	HVAC Technician	Bonneville Power/TECOM Inc.	OR
Guy Cannova	Maintenance Mechanic	General Services Administration	OR
Norman Clare	Building Officer	Trident Refit Facility	WA
Sam Culver	Electronic Technician	Naval Undersea Warfare Center	WA
Pat Cunningham	Facilities Planner	Pacific Northwest National Laboratory	WA
Greg Daiker	Maintenance Engineering	U.S. Postal Service	OR
Darcy DeRosia	Facilities Management	Naval Air Station, Whidbey Island	WA
Donna Eberhart	Facility Specialist	Pacific Northwest National Laboratory	WA
Charles Eddington	Building Engineer	General Services Administration	WA
David Erickson	Senior Technician	Pacific Northwest National Laboratory	WA
Patrick Fallon	Senior Technician	Pacific Northwest National Laboratory	WA
Craig Hall	Building Technician	Pacific Northwest National Laboratory	WA
Howard Hebdon	Maintenance Mechanic	General Services Administration	OR
Chris Helmer	Operating Engineer	General Services Administration	OR
Karen Hill	Senior Building Technician	Pacific Northwest National Laboratory	WA
Wayne Hill	Maintenance Mechanic	Naval Station Everett	WA
Steven Hudspeth	Supervisor	Naval Station Everett	WA
Dave Johnson	Engineering Technician	Trident Refit Facility	WA
Michael Johnson	Controls Mechanic	Naval Station Everett	WA
Fred Keithan	Operating Engineer	General Services Administration	OR
Bryan Kiser	Facilities Management Intern	Madigan Army Medical Center	WA
Charles Kwasny	Facility Manager	Hanscom Air Force Base	New England

Name	Title	Agency/Facility	State
Garth LaComb	Facility Management Intern	Madigan Army Medical Center	WA
Francisco Lalas	Energy Manager	Naval Station Everett	WA
David Long	Maintenance Manager	U.S. Postal Service	OR
Jack Manchini	Maintenance Engineer	U.S. Postal Service	New England
Robert Manos	Chief Building Engineer	General Services Administration	WA
Kimberly Martel	Construction Electrician	Naval Station Everett	WA
Eddie Mason	Hazardous Materials & Management Technician	Naval Undersea Warfare Center	WA
Stewart McLaughlin	Assistant Facilities Manager	Bonneville Power/TECOM Inc.	OR
Glen Miller	Hazardous Waste Manager	Naval Station Everett	WA
Neil Moffatt	Production Controller	Oregon Air National Guard	OR
Diane Murdock	Staff Engineer	General Services Administration	WA
Martin Murray	Facilities Technician	Pacific Northwest National Laboratory	WA
Morris Ogunleye	Mechanical Engineer	Federal Aviation Administration	WA
Kevin Olinger	Stationary Engineer	Bonneville Power/TECOM Inc.	OR
Vic Parks	Building Technician	Pacific Northwest National Laboratory	WA
Larry Phillips	Electronics Technician	Naval Station Everett	WA
F. Lee Plumb	HVAC Mechanic	Naval Station Everett	WA
Hari Ram	HVAC Mechanic	Bonneville Power/TECOM Inc.	OR
Jeff Rencken	Project Manager	Pacific Northwest National Laboratory	WA
Steven Sala	Building Equipment Mechanic	U.S. Postal Service	OR
Don Schumacher	Manager Maintenance	U.S. Postal Service	WA
Robert Schumacher	Building Technician	Pacific Northwest National Laboratory	WA
David Shields	Engineering Technician	Trident Refit Facility	WA
Gina Wellsfry	Facility Technician	Pacific Northwest National Laboratory	WA
Rhonda Wierman	Facility Project Manager	Pacific Northwest National Laboratory	WA
Wayne Witzel, Jr.	Manager Maintenance Operations	U.S. Postal Service	WA

BOC Level II Awardees

Name	Title	Agency/Facility	State
William Church	Operating Engineer	General Services Administration	OR
Candance Hein	Manager	Oregon Air National Guard	OR
Fred Keithan	Operating Engineer	General Services Administration	OR

A Record of Energy Achievement at Naval Air Station Keflavik, Iceland

Located slightly below the Arctic Circle, the climate and geology surrounding U.S. Naval Air Station (NAS) Keflavik, Iceland, presents unique energy conservation challenges and opportunities. Average monthly wind speeds vary from 14 to 20 miles per hour with gusts exceeding 100 miles per hour. Sunlight varies dramatically throughout the year from 4 hours per day in December to more than 21 hours daily in June. For 2 to 3 months in the summer there is continuous daylight in Iceland, and early spring and late autumn bring extended twilight. Iceland has a changeable yet relatively mild coastal climate thanks to the warm Gulf Stream. The average winter temperature in Reykjavik, the capital, is similar to New York City, about 32 degrees Fahrenheit in January. Glaciers cover 5 percent of the country, although they are thinning and retreating.

Over the past several years, the NAS leadership and personnel have met the task of energy awareness head-on. As a result, NAS Keflavik has already reduced its energy consumption almost 40 percent below the 1985 energy baseline. And with heated water and electricity from a geothermal generating station, the energy used at NAS Keflavik is environmentally friendly.

Keflavik's record of energy savings is a result of the dedication of many individuals working together as a team. Keflavik's renovation and construction projects have incorporated the latest technologies, including LED exit lights, high- and low-pressure sodium luminaires, increased insulation, and high-efficiency windows. Timed lights and motion sensors in family housing units and throughout the base add to the savings. ENERGY STAR® computers and appliances are also becoming more common.

Recently, an aggressive consolidation and demolition project helped rid the base of energy inefficient facilities. Also, a re-negotiated geothermal utility contract has resulted in significant energy and cost savings of nearly $1.7 million during FY 2001.

Scene outside NAS Keflavik geothermal/electricity plant. As waste geothermal water is released onto a lava field—a pool and a major tourist attraction are formed.

Projects for 2002 include completing a comprehensive building monitoring program, along with planning Earth Day activities, and developing an energy conservation demonstration program for local schools.

For more information, please contact Jeremy Freeman of NAS Keflavik at 011-354-425-4059 or jeremy.freeman@naskef.navy.mil.

Keyport Naval Center Shines Light on Energy Waste

Relentless programs dedicated to saving energy, water, and money, and preventing pollution at Naval Undersea Warfare Center (NUWC) Division Keyport, Washington, have put Keyport front and center in the Federal energy conservation spotlight.

NUWC Keyport was a recipient of the 2001 Federal Energy and Water Management Award and the 2001 Secretary of Navy Energy Award for reducing energy consumption by 8.7 percent in 2000 from the previous year—a 30 percent reduction compared to 1985 levels. Keyport also initiated a host of programs in FY 2000—including a spot market natural gas contract through the Defense Energy Support Center, saving $48,000 in the course of the year. In addition, its "water-wise" landscaping program saves 200,000 to 400,000 gallons of water per year and reduces the facility's landscape maintenance costs by $70,000 per year.

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Navy's Sugar Grove Hailed for Leadership in Energy Efficiency

Renowned for its environmental charms—from lush valleys to wild rivers—West Virginia is a place of immense beauty and environmental challenges. Nestled in its own green pocket near the eastern edge of the State, the Naval Security Group Activity (NSGA) Sugar Grove is building a strong reputation as a West Virginia environmental champion. Sandwiched between the Monongahela National Forest to the west and Virginia's Shenandoahs and the George Washington National Forest to the east, NSGA Sugar Grove has consistently distinguished itself for its green ethics. The base has been designated a Point of Light by the Corporation for National and Community Service for leading its community in recycling, conserving natural resources and wild areas, and preventing pollution.

This past fall, NSGA Sugar Grove also became a recipient of the Secretary of Navy's Energy Award for its exemplary program. The energy program team at NSGA Sugar Group was hailed for its leadership and commitment to comprehensive energy efficiency program implementation and effectiveness. Sugar Grove's success stories can be replicated at Department of Navy facilities worldwide.

In FY 2000, NSGA Sugar Grove reduced its energy consumption 22 percent by embarking on a comprehensive array of energy- and money-saving initiatives. The base upgraded lighting systems saving approximately $32,000 per year. The base's natural gas system was also renovated, saving the facility $5,500 annually. A $25,000 investment for the repair of electrical grid components is saving the base an estimated $5,000 per year. NSGA Sugar Grove also replaced two 20-year-old air conditioning units with one packaged terminal air conditioning (PTAC) unit; replaced electric heating units with PTAC units; and replaced a 30-year-old furnace with three PTAC units.

Sugar Grove metered its gas and electric usage to track consumption and target facilities for load-shedding and energy conservation programs. Energy managers met with Allegheny Power, the local utility company, and engineers from Naval Facilities Engineering Command-Atlantic Division to determine the feasibility of load shedding. The base also

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KEYPORT SHINES LIGHT ON ENERGY WASTE
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"This [award] is a tribute to the spirit of the Keyport employees and to their stewardship of the environment of the Keyport base," said Captain Mary Townsend-Manning, Commander of Naval Undersea Warfare Center Division, Keyport. But many at Keyport say that their experience in energy conservation has a lighter side, a point noted by Assistant Secretary of the Navy Hansford T. Johnson during the Secretary of Navy Energy Awards ceremonies in October 2001. Assistant Secretary Johnson noted the facility's nighttime energy patrols, led by flashlight-wielding Energy Manager Phil Beste, and its encounters with wildlife.

Keyport's nighttime energy conservation patrols are a proven success, reducing energy waste by identifying unnecessary lighting, equipment left powered up but unused, and HVAC controls set inappropriately for unoccupied areas. Unlike daytime patrols, nighttime energy sweeps set the stage for unique encounters. According to energy team members, it is not unusual to hear the shrieks of startled personnel who, while securing overhead lighting in cavernous warrens, inadvertently startle and enrage nesting Canada Geese. Armed with flashlights, facility energy teams fan out in groups of two or three through the darkened base. Teams have literally stumbled across nesting geese, surprised foraging raccoons, and been swooped upon by hunting owls and bats.

Keyport's night energy conservation patrols are another Department of Navy success story. Despite their unique brand of surprises, night patrols alone at Keyport resulted in an annual energy use reduction of 3 percent, proof again that small savings can result in big success.

For more information, please contact Phil Beste of NUWC at 360-396-5170 or pbeste@kpt.nuwc.navy.mil.

FEMP Web Site on Utility Management Links Up with PNNL

In collaboration with DOE's Pacific Northwest National Laboratory, FEMP's utility services and restructuring web site has expanded its capabilities with ready access to utility management information in an easy-to-use format. The FEMP utility management site has even more to offer with its new link to PNNL's utility management web site. The PNNL utility management link can be accessed at www.eren.doe.gov/femp/utility/utility_restruct.html and then click on "Utility Market Restructuring."

The PNNL web link focuses on managing utility costs and improving energy use efficiency. The site's electric and gas pages provide information on utility restructuring at the State and Federal levels, energy prices and price trends, potential supply reliability concerns, and other topics. The energy use management pages inventory potential sources of assistance and funding for energy efficiency and energy management projects. The three major sections include:

Electric Cost Management—This section contains information about the status of electric utility restructuring in each State and how it affects your facility. There is also a glossary of electric terms, information about regional transmission organizations, State power reliability, frequently asked questions and answers, FEMP resources, a primer about electric utility restructuring, informative presentations, and links to other helpful web sites.

Gas Cost Management—This section provides information about the status of gas utility restructuring in each State and how it affects your facility. There is also a glossary of gas terms, information about customer classes, frequently asked questions and answers, FEMP resources, and links to other helpful web sites.

Energy Use Management—Provides information about funding and assistance through energy efficiency, load management, and demand response programs in your State. The section includes information on public benefit funded programs, which are paid through a Systems Benefit Charge typically instituted as part of restructuring legislation or rules.

The site is currently being enhanced to change the focus from tracking energy restructuring at the State level to concentrating on managing energy costs and usage. The sections on regional transmission organizations and power reliability will be maintained, and new sections offering information about utility management fundamentals and renewable energy will be added.

For more information, please contact Mike Warwick of PNNL at mike.warwick@pnl.gov or David McAndrew of FEMP at david.mcandrew@ee.doe.gov.

NAVY'S SUGAR GROVE HAILED FOR LEADERSHIP IN ENERGY EFFICIENCY
(continued from page 21)

worked with Allegheny Power to purchase natural gas on the spot market.

NSGA Sugar Grove also effectively communicates the importance of energy conservation to personnel. The base conducted numerous Energy Awareness Week activities and distributed Navy energy awareness T-shirts, coffee mugs, water bottles, and other outreach materials. Tours of the base's recycling center were also offered. The base's annual energy fair highlighted the importance of conserving water and featured demonstrations of water-efficient fixtures and heat sensor meter technology used to detect defective electrical components and faulty connections.

"Energy conservation is very important to the entire Navy community at Sugar Grove," said Commander Forbes MacVane, Commanding Officer of Naval Security Group Activity Sugar Grove. "It's a team effort which not only helps how we do our mission but also saves the Navy and U.S. taxpayers money."

"The Sugar Grove team will continue to explore and implement new and innovative energy conservation programs," MacVane said. "While better lighting was the focus of this year's work, our command, which experiences very hot and cold weather, will look for ways to improve air conditioning and heating efficiency. Education and new technology will continue to play a major role in our energy conservation program," he said.

For more information, please contact Jack Hedrick of NSGA Sugar Grove at 304-249-6340 or jlhedrick@nsgasg.navy.mil.

Updated Life-Cycle Costing Tool Now Available

The latest update of the Building Life-Cycle Cost (BLCC) computer program was released April 1, 2002. Executive Order 13123 directs Federal energy managers to base all investment decisions for Federal energy and water conservation and renewable energy projects on lowest life-cycle cost (LCC) analyses as defined in 10 CFR 436A and OMB Circular A-94. The BLCC programs, developed and supported by the National Institute of Standards and Technology (NIST) under FEMP sponsorship, are a valuable economic tool to assist Federal energy managers with performing LCC analyses. NIST's annual update of the BLCC program version BLCC5.1-02 includes the DOE/FEMP discount rates and energy price projections from the Energy Information Administration for 2002. Two modules for evaluating Military Construction (MILCON) projects have also been added to BLCC5.1-02 this year. (See figures 1 and 2 on page 24.) BLCC5.1-02 now contains the following four modules for analyzing energy and water conservation and renewable energy projects:

- Analyses for Federal agency-funded projects,
- Analyses for Federal agency projects financed through energy savings performance contracts or utility energy savings contracts,
- MILCON analyses for DOD-funded projects, and
- MILCON analyses for projects under DOD's Energy Conservation Investment Program.

NIST will support the DOS-based BLCC4 program until the remaining modules for non-energy conservation projects (OMB and MILCON) and private-sector projects with tax analysis have been transferred to the multi-platform BLCC5. Both programs are downloadable from FEMP's web site at www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html#blcc. More than 3,000 downloads have been registered since the initial release of BLCC5 in October 2000.

For a detailed explanation of the principles of life-cycle cost (LCC) analysis and their application to energy and water conservation projects, please request *Handbook 135, Life-Cycle Costing Manual for the Federal Energy Management Program*, from the DOE HELP Desk at 1-800-DOE-EREC (1-800-363-3732). *Handbook 135* can also be downloaded from the NIST Office of Applied Economics web site at www.bfrl.nist.gov/oae/publications/handbooks/135.pdf. The FEMP HELP Desk and web site also have available the Annual Supplement to *Handbook 135, Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis, April 2002*—a publication that contains tables of the discount factors that are embedded in the computer programs.

NIST, under FEMP sponsorship, offers a 2-day LCC classroom workshop in the spring and fall and a 2-hour FEMP LCC telecourse for energy managers every March. The LCC Basic classroom workshop focuses on the method and the underlying principles and assumptions of LCC analysis. The LCC Project-Oriented workshop focuses on how to structure more complex projects for LCC analysis using the BLCC5 program. The next LCC workshop will be a combined Basic/Project-Oriented Workshop held in Rockville, Maryland, June 18-19, 2002.

To register for the upcoming LCC workshops, please contact Cecilia Mendoza at 509-375-2518, 509-372-4990 (fax), cecilia.mendoza@pnl.gov, or go to www.eren.doe.gov/femp/resources/training/fy2002_lifecycle2.html.

For further information on the LCC method and BLCC programs, please contact Sieglinde Fuller sieglinde.fuller@nist.gov or Amy Rushing amy.rushing@nist.gov at the Office of Applied Economics, Building and Fire Research Laboratory, NIST. Also see NIST's Office of Applied Economics web site at www.bfrl.nist.gov/oae.

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UPDATED LIFE-CYCLE COSTING TOOL NOW AVAILABLE
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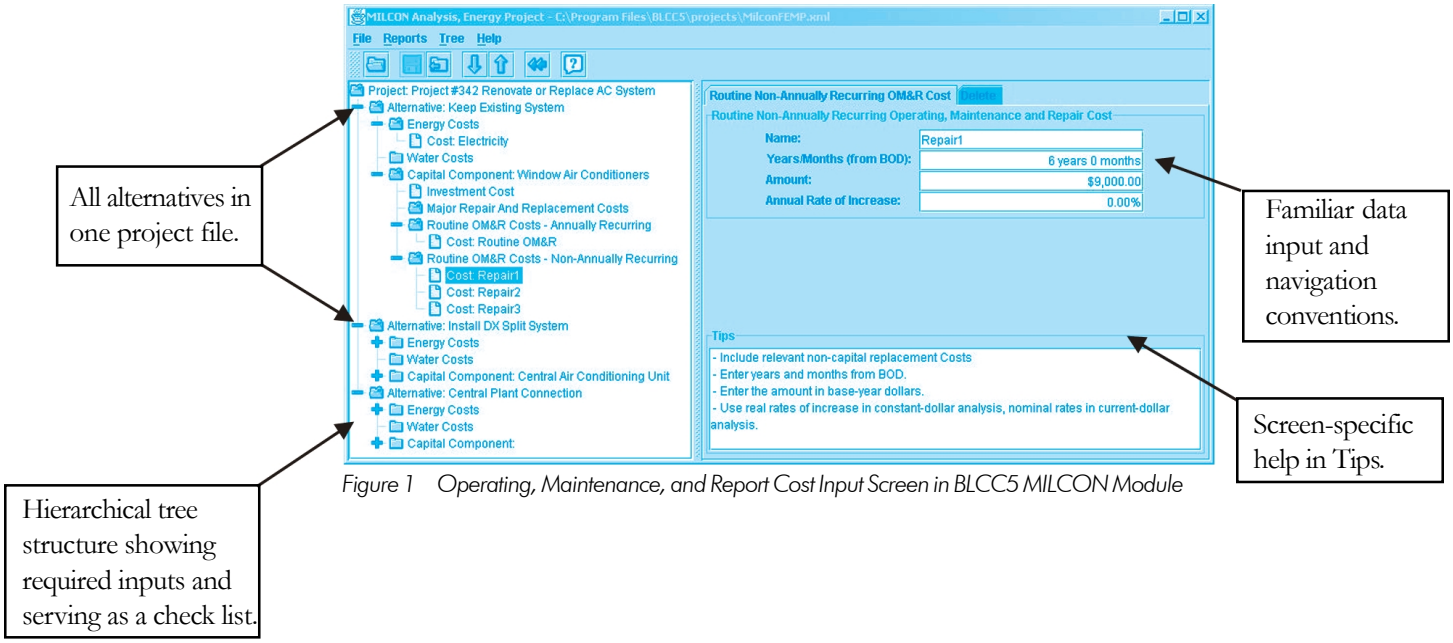
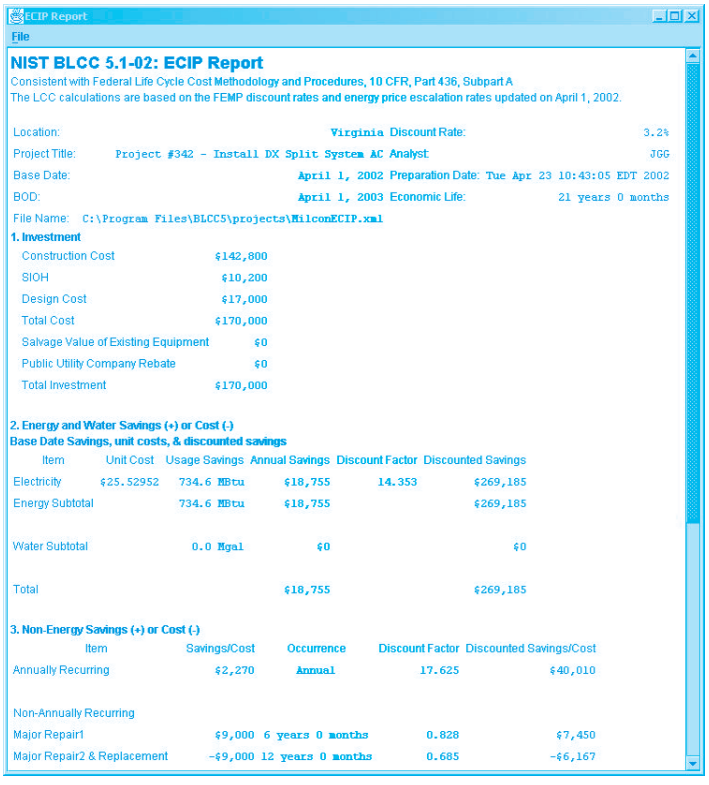


Figure 1 Operating, Maintenance, and Report Cost Input Screen in BLCC5 MILCON Module



ECIP Report

File

NIST BLCC 5.1-02: ECIP Report

Consistent with Federal Life Cycle Cost Methodology and Procedures, 10 CFR, Part 436, Subpart A
The LCC calculations are based on the FEMP discount rates and energy price escalation rates updated on April 1, 2002.

Location:	Virginia	Discount Rate:	3.2%
Project Title:	Project #342 - Install DX Split System AC	Analyst:	JGG
Base Date:	April 1, 2002	Preparation Date:	Tue Apr 23 10:43:05 EDT 2002
BOD:	April 1, 2003	Economic Life:	21 years 0 months

File Name: C:\Program Files\BLCC5\projects\MilconECIP.xml

1. Investment

Construction Cost	$142,800
SIOH	$10,200
Design Cost	$17,000
Total Cost	$170,000
Salvage Value of Existing Equipment	$0
Public Utility Company Rebate	$0
Total Investment	$170,000

2. Energy and Water Savings (+) or Cost (-)
Base Date Savings, unit costs, & discounted savings

Item	Unit Cost	Usage Savings	Annual Savings	Discount Factor	Discounted Savings
Electricity	$25.52952	734.6 MBtu	$18,755	14.353	$269,185
Energy Subtotal		734.6 MBtu	$18,755		$269,185
Water Subtotal		0.0 Mgal	$0		$0
Total			$18,755		$269,185

3. Non-Energy Savings (+) or Cost (-)

Item	Savings/Cost	Occurrence	Discount Factor	Discounted Savings/Cost
Annually Recurring	$2,270	Annual	17.625	$40,010
Non-Annually Recurring				
Major Repair1	$9,000	6 years 0 months	0.828	$7,450
Major Repair2 & Replacement	-$9,000	12 years 0 months	0.685	-$6,167

Figure 2 Excerpt from MILCON Energy Conservation Investment Program Report

DOE to Host Free Utility Workshops in Washington, D.C.

On July 23-25, 2002, DOE will host two free workshops at its headquarters in Washington, D.C. Sponsored by FEMP and GSA, the first workshop "Evolving Energy Markets" will bring together energy experts for a 1-day session to explain the fundamentals of how today's utilities operate, update you on how utility restructuring is proceeding, and help identify opportunities that these evolving markets might provide for better energy management practices. Attendees will also hear about GSA's role in energy procurement and learn about options for purchasing renewable power.

The second workshop, "Utility Energy Services Contracting," on July 24-25, 2002, will provide Federal customers with an overview of the contracting options and services available from those local utility companies who offer engineering, financing, and installation of cost effective energy and water savings projects. Participants will learn about the typical project process, from the audit phase to commissioning equipment. Upon completing this workshop, participants will have the contracting and technical knowledge to begin a project at their facility. This innovative alternative financing opportunity provides a mechanism to help solve facility problems and meet program objectives and goals. Priority will be given to Federal personnel; however, State and local government customers are welcome.

The registration fee is waived for this workshop. Space is limited, so register by calling FEMP's Workshop Hotline at 703-243-8343 by July 16, 2002.

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Distributed Energy Resources at Federal Facilities Workshop
June 25-26
Chicago, IL
www.eren.doe.gov/femp/techassist/der_resources.html
410-953-6277

Super ESPC
July 16-17
Chicago, IL
www.eren.doe.gov/femp/resources/training/fy2002_super_espc.html
703-243-8343

Advanced Metering for Federal Officials
July 18
Washington, DC
www.ase.org/july18metering.htm
202-530-2243

Evolving Energy Markets
July 23
Washington, DC
703-243-8343

Utility Energy Services Contracting Workshop
July 24-25
Washington, DC
703-243-8343

Labs 21 High Performance, Low-Energy Design Course
October 10
Durham, NC
www.epa.gov/labs21century/training/index.htm

Distributed Energy Resources at Federal Facilities Workshop
October 23-25
Boston, MA
www.eren.doe.gov/femp/techassist/der_resources.html

Upcoming Conferences

Mid-Atlantic Sustainability Conference
June 26-29
Newark, NJ
www.nesea.org/buildings/be/nj/
413-774-6051

Indoor Air 2002
June 30-July 5
Monterey, CA
www.indoorair2002.org
831-426-0148

FedFleet 2002
July 22-25
Kansas City, MO
www.fedfleet.org
800-315-4333

2002 State Energy Program Rebuild America National Conference
July 29-August 1
New Orleans, LA
www.2002conference.com
301-589-0100

2002 ACEEE Summer Study on Energy Efficiency in Buildings
August 18-23
Pacific Grove, CA
www.aceee.org/conf/02ss/02call.htm
302-292-3966

Solar Decathlon
September 19-26
Washington, DC
www.eren.doe.gov/solar_decathlon/
303-275-4050

2002 World Energy Engineering Congress
October 9-11
Atlanta, GA
www.energycongress.com/WEECbody.htm
770-447-5083

Excellence in Building 2002
October 9-12
Mesa, AZ
www.eeba.org/conference/
952-881-1098

FEMP Contacts

For information on topics not listed here, call the FEMP Help Desk at 1-800-363-3732.

FEMP Office:	202-586-5772
FEMP Fax:	202-586-3000
FEMP on the Web:	www.eren.doe.gov/femp

Beth Shearer
Director
202-586-5772

Joan Glickman
Special Assistant
202-586-5607
joan.glickman@ee.doe.gov

Schuyler (Skye) Schell
Office Director, Agency Services
202-586-9015
schuyler.schell@ee.doe.gov

Brian Connor
Office Director, Internal Departmental Services
202-586-3756
brian.connor@ee.doe.gov

Veronica Bellamy
Administrative Assistant
202-586-2047
veronica.bellamy@ee.doe.gov

Helen Krupovich
Weekly Reporting
202-586-9330
helen.krupovich@ee.doe.gov

Ladeane Moreland
Administrative Assistant
202-586-9846
ladeane.moreland@ee.doe.gov

Customer Service, Planning and Outreach

Nellie Greer
Awards Program, Communications
202-586-7875
nellie.tibbs-greer@ee.doe.gov

Annie Haskins
Outreach, FEMP Focus, FEMP Web Site
202-586-4536
annie.haskins@ee.doe.gov

Rick Klimkos
Annual Report, Interagency Coordination
202-586-8287
rick.klimkos@ee.doe.gov

Michael Mills
Policy
202-586-6653
michael.mills@ee.doe.gov

External Service Delivery

Ted Collins
Training Programs, New Technology Demonstration Program
202-586-8017
theodore.collins@ee.doe.gov

Anne Crawley
Renewable Energy, Greening
202-586-1505
anne.crawley@ee.doe.gov

Danette Delmastro
Super ESPC Program
202-586-7632
danette.delmastro@ee.doe.gov

Beverly Dyer
ENERGY STAR®, Sustainability
202-586-7241
beverly.dyer@ee.doe.gov

Brad Gustafson
Utility Program
202-586-5865
brad.gustafson@ee.doe.gov

Shawn Herrera
Design Assistance, DER, CHP
202-586-1511
shawn.herrera@ee.doe.gov

Ab Ream
ALERT Teams, O&M, Water
202-586-7230
ab.ream@ee.doe.gov

Tatiana Strajnic
Super ESPC Program
202-586-9230
tatiana.strajnic@ee.doe.gov

Alison Thomas
Industrial Facilities, Procurement
202-586-2099
alison.thomas@ee.doe.gov

Departmental Utility and Energy Team

Alan Gann
DOE Utility Management
202-586-3703
alan.gann@ee.doe.gov

Steve Huff
DOE Utility Management, FEMAC
202-586-3507
steven.huff@ee.doe.gov

Will Lintner
Departmental Energy Management, Labs21
202-586-3120
william.lintner@ee.doe.gov

David McAndrew
Green Power, Utility Program
202-586-7722
david.mcandrew@ee.doe.gov

Vic Petrolati
Departmental Energy Management
202-586-4549
victor.petrolati@ee.doe.gov

Will Prue
Departmental Energy Management, SAVEnergy
202-586-4537
wilfred.prue@ee.doe.gov

DOE Regional Office (RO) and Field Office FEMP Team

Doug Culbreth
Atlanta RO
919-782-5238
carson.culbreth@ee.doe.gov

Beth Dwyer
Golden
303-275-4719
beth_dwyer@nrel.gov

Curtis Framel
Seattle RO
206-553-7841
curtis.framel@ee.doe.gov

Sharon Gill
Chicago RO
312-886-8573
sharon.gill@ee.doe.gov

Lisa Hollingsworth
Atlanta RO
404-562-0569
lisa.hollingsworth@ee.doe.gov

Arun Jhaveri
Seattle RO - Technical Assistance
206-553-2152
arun.jhaveri@ee.doe.gov

Randy Jones
Denver RO
303-275-4814
randy_jones@ee.doe.gov

Paul King
Boston RO
617-565-9712
paul.king@ee.doe.gov

Claudia Marchione
Philadelphia RO
215-656-6967
claudia.marchione@ee.doe.gov

Cheri Sayer
Seattle RO - Financing
206-553-7838
cheri.sayer@ee.doe.gov

Eileen Yoshinaka
Seattle RO in HI
808-541-2564
eileen.yoshinaka@ee.doe.gov

Principal DOE National Laboratory Liaisons

Bill Carroll
Lawrence Berkeley National Laboratory (LBNL)
510-486-4890
wlcarroll@lbl.gov

Mary Colvin
National Renewable Energy Laboratory (NREL)
303-384-7511
mary_colvin@nrel.gov

Patrick Hughes
Oak Ridge National Laboratory (ORNL)
865-574-9337
hughespj1@ornl.gov

Paul Klimas
Sandia National Laboratory (SNL)
505-844-8159
pcklima@sandia.gov

Bill Sandusky
Pacific Northwest National Laboratory (PNNL)
509-375-3709
bill.sandusky@pnl.gov

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If you are making projects happen at your Federal facility, FEMP would like to hear from you. Please submit project descriptions to Annie Haskins at the address listed below. You will be contacted for additional information if your project is selected to be featured in a future edition of the *FEMP Focus*.

Address mail to:

Attn: FEMP Focus
Federal Energy Management Program
U.S. Department of Energy, EE-90
1000 Independence Avenue, SW
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or e-mail: annie.haskins@ee.doe.gov

To Change Subscription Information, Contact:

Judy Hockenbery
MA-221–Germantown
U.S. Department of Energy
Germantown, MD 20874-1290
301-903-3118, 301-903-9271 (Fax)
judy.hockenbery@hq.doe.gov

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